

## 6.10 BIOLOGICAL RESOURCES

### 6.10.1 Affected Environment

This section is divided into discussions of general wildlife and vegetation and habitat types common to DMR, including sensitive species and habitats known to occur or with the potential to occur in this area. The DMR ROI was based largely on the potential for damage from fires during SBCT training. Fire has been evaluated to be the most far-reaching impact of SBCT on DMR, with the exception of Dillingham Trail, because of its ability to affect a large area. Fire is a lesser concern for Dillingham Trail, where trampling/crushing, introduction of exotic species, and noise are the major concerns. The ROI at DMR has been determined, based on the above factors, to correspond with the installation boundary. The DMR ROI also includes a 164-foot (50-meter) buffer on either side of Dillingham Trail as well as a portion of the coastline and adjacent Pacific waters over which aircraft maneuvers may occur.

The waters that surround the islands in the Hawaiian chain host an array of marine wildlife (NMFS 2000a to 2000bb) and extensive coral reef ecosystems that support a variety of industries and resource uses (HCRI 2002). The location and sensitivity of these ecosystems were taken into account when determining the ROI for the SBCT project areas. Marine organisms and wildlife are evaluated when they occur adjacent to or in the vicinity of the terrestrial ROI. The DMR Marine ROI is represented in Figures 6-15 and 3-13.

Biological data were collected from numerous sources, including the USFWS, NOAA Fisheries, DLNR, HBS, HINHP, and various biological surveys and environmental documents pertinent to the species and habitats of DMR. For details on pertinent regulations see Definition and Regulatory Considerations in Appendix N.

This DEIS was developed concurrently with ESA Section 7 consultation with USFWS. The biological resource section has been updated to reflect additional information resulting from these consultations.

#### **Recovery Plan**

Two animal species with recovery plans are known to or have the potential to occur within the DMR ROI. These species are listed in Appendix I-1a.

#### **Vegetation**

The area surrounding DMR is sparsely populated, and neighboring land is either owned privately or by the State of Hawai'i. Botanical surveys to identify rare plants, communities, and potential threats to these resources have been conducted intermittently since 1977. HINHP surveyed the area in 1995, but the visit was brief due to the small size and rugged terrain of the training area. During this site visit, HINHP staff documented the only known example in Hawai'i of extremely dry closed canopy forest. These natural resource surveys have been used for the resource assessments in the *Endangered Species Management Plan Report, O'ahu Training Areas* (R. M. Towill Corp. 1997b), as well as the more recent *O'ahu Training*

[Figure 6-15](#)

Dillingham Military Reservation Biological Region of Influence

*Areas Natural Resource Management Report* (PCSU 2001) and *O'ahu Training Areas INRMP* (USARHAW and 25<sup>th</sup> ID[L] 2001a). Figure 6-16 shows the locations of vegetation communities described below that occur within the DMR ROI. The low-lying areas of DMR are populated mostly by nonnative vegetation, some species posing serious threats to the native natural communities that exist in more remote locations of this small training area. Guinea grass (*Panicum maximum*) is becoming more widespread in DMR. It regenerates quickly after fire and can inhibit the growth of other plants by its dense matting and by producing chemicals that discourage other plants from taking root.

There are only two types of native lowland dry communities on DMR. Lonomea (*Sapindus oahuensis*) forest is the only known occurrence in Hawai'i of a closed canopy, extremely dry forest type. Little information is available about this type of forest due to its rarity. On DMR it is found on the cliff slopes at the southern end of the training area. It is considered to be globally imperiled. The other forest type is wiliwili (*Erythrina sandwicensis*). This is also found in the sloping cliff areas of DMR but grows in patches with the Lonomea Forest. These areas are surrounded by heavily degraded weedy shrubland.

A jurisdictional wetland was identified in the DMR ROI and is described further under Biologically Significant Areas (Figure 6-17). This wetland is perched and is outside of the area that would be used for maneuver training. An additional wetland area was investigated and determined to be non-jurisdictional and, therefore, not regulated under Section 404 of the Clean Water Act based on an evaluation by the Corps of Engineers, Honolulu District, Regulatory Branch dated September 4, 2002. No training or construction is proposed to occur in this area.

### ***Disturbed Habitat***

Invasive and noxious weeds targeted for eradication in DMR include padang cassia (*Cinnamomum burmannii*), Chinese banyan (*Ficus macrocarpa*), and fountain grass (*Pennisetum setaceum*) (USARHAW and 25<sup>th</sup> ID[L] 2001a). Widespread weed species would be controlled where they threaten native plants and communities.

Populations of feral pigs (*Sus scrofa scrofa*) directly affect native plants and contribute to numerous ecological problems (Atlas 1998). The effects of these wild pigs include trampled and grazed native plants, erosion, and landslides (USARHAW and 25<sup>th</sup> ID [L] 2001a; PCSU 1999, 2000, 2001). Browsing and otherwise destroying the native vegetation encourages nonnative plants to become established, which can severely affect the habitat. What native habitat remains at DMR is accessible to pigs, and signs of pig activity have been observed.

Habitat disturbance by humans on DMR includes possible disturbance by military training activities. Trampling associated with training activities could affect populations of rare plants (R. M. Towill Corp. 1997b). Nonmilitary impacts on the area include those from hiking and occasional hunting and poaching.

Fire threat is moderate in DMR and is a threat to native plants and ecological communities. Nonmilitary fire impacts could come from vehicles, campfires, arsonists, cigarettes, and

**Figure 6-16**

Vegetation Communities in the Dillingham Military Reservation Region of Influence

[Figure 6-17](#)

Dillingham Military Reservation USACE Jurisdictional Wetland And Biologically Significant Areas

civilian use of the airfield (R. M. Towill Corp. 1997b). Civilian use might also contribute to pollution and introduction of exotic species into the area. Additionally, the rugged terrain of the training area limits access for fire suppression and control. DMR is a small parcel of land and the training that takes place there is relatively low impact, so there are few ITAM requirements for this range. The ITAM program at DMR provides for collection of plant specimens to document species and supports Range Division through the use of GIS and GPS. The IWFMP includes provisions for this range.

### **Wildlife**

Zoological field surveys on DMR have been limited due to the rugged terrain and small size. Surveys have focused on special status invertebrates, mammals, and birds. No specific reptile surveys have been conducted on DMR due to the absence of native terrestrial reptiles and amphibians on the Hawaiian Islands. Surveys of DMR were made by the Environmental Impact Study Corp. in 1977, the HINHP in 1995, and PCSU natural resource staff in 2000 and 2001. The following sections describe the general presence of species within the invertebrate, mammal, bird, and fish species. There are two wildlife species with a recovery plan in the ROI (Appendix I-1).

#### Invertebrates

The native invertebrates on DMR could include dragonflies (*Nesogonia blackburni*) and damselflies (*Megalagnion hawaiiense*) (USARHAW and 25<sup>th</sup> ID[L] 2001a). In surveys of DMR conducted in 1995, staff from the HINHP detected three nonnative invertebrates: cannibal snail (*Englandina rosea*), two-spotted leafhopper (*Sophonia rufofascia*), and Louisiana crayfish (*Procambarus clarkii*). The black twig borer is suspected to occur on DMR, based on the presence of host species, but has not yet been observed.

Humans have purposely or accidentally introduced these nonnative species to O‘ahu. They now threaten the native snail species through competition for resources and predation, as well as by the spread of disease.

#### Amphibians

There are no native terrestrial amphibians on the Hawaiian Islands. Nonnative amphibians with the potential to occur at DMR include the green and black dart-poison frog, bullfrog, wrinkled frog, giant toad, coqui frog, and Cuban tree frog (USARHAW and 25<sup>th</sup> ID[L] 2001a). These species were introduced into O‘ahu from other countries and have inhabited areas where adequate aquatic habitat and surrounding vegetation exists.

#### Reptiles

The Hawaiian Islands have no native terrestrial reptiles. Nonnative reptiles with the potential to occur at DMR include the green anole, mourning gecko, stump-toed gecko, tree gecko, Indo-Pacific gecko, house gecko, metallic skink, and gold dust day gecko (USARHAW and 25<sup>th</sup> ID[L] 2001a).

#### Terrestrial Mammals

The Hawaiian hoary bat has the potential to occur on DMR (PCSU 2001). It is the only native terrestrial mammal on the Hawaiian Islands. The following nonnative species may

occur on DMR: feral pig, feral cat, feral dog, Norway rat, black rat, Polynesian rat, and house mouse.

### Birds

The following indigenous forest bird species have been recorded on DMR: Hawaiian duck (*Anas wyvilliana*), Hawaiian coot (*Fulica alai*), Hawaiian goose (*Branta sandvicensis*), and Hawaiian moorhen (*Gallinula chloropus sandvicensis*). The pueo (*Asio flammeus sandwichensis*) is believed to occur on DMR, based on the presence of adequate habitat and prey.

Nonnative bird species believed to occur in DMR include the red-billed leiothrix, white-rumped shama, Japanese bush warbler, rock dove, spotted dove, zebra dove, common myna, red-vented bulbul, and Japanese white-eye. The nutmeg manikin, red-crested cardinal, barn owl, Erchel's francolin, ring-necked pheasant, and northern cardinal are also species that have been introduced by humans on O'ahu. This list of nonnative species is based on those species present on the nearby Māhewa Military Reservation which has areas of corresponding habitat (R. M. Towill Corp. 1997b).

### Fish

There are no documented studies of fish in DMR streams (USARHAW and 25<sup>th</sup> ID[L] 2001a).

### Marine Biological Resources

Since DMR is adjacent to a small segment of beachfront, a portion of the DMR ROI is extended to include this portion of the coast and the nearshore waters adjacent to the coast in order to address potential impacts on marine biological resources. This area is outside the Hawaiian Islands Humpback Whale National Marine Sanctuary waters (see Figure 3-13). The sanctuary does encompass marine waters in north O'ahu near, but not adjacent to, the Dillingham ROI.

There are no coral reef "hot spots" in the DMR ROI, that is, no specific coral reef areas of management concern (CRAMP 2003). There are, however, coral reefs in the coastal waters of the DMR ROI within a half a mile of the shoreline.

Marine wildlife does occur in the coastal and marine portion of the DMR ROI. The adjacent beachfront/coastline area of DMR may provide shore habitat for some marine wildlife, such as sea turtles or monk seals.

Distribution and abundance of marine mammals and sea turtles in Pacific waters vary seasonally and spatially; that is, the numbers and types of animals may vary in the nearshore versus the offshore regions, as well as by the time of year (Calambokidis et al. 1997; Leatherwood et al. 1982; Mobley et al. 1999, 2000; NMFS 2000a to 2000bb). All marine mammal species are protected under the MMPA, regardless of their status under the ESA. Informal consultation with NOAA Fisheries has been initiated for marine mammals in the DMR ROI. Both MMPA and ESA protected marine wildlife species that may occur in the DMR ROI seasonally, permanently, or as transients, are listed in Table 6-18.

Table 6-18

## Sensitive Marine Wildlife Occurring or Potentially Occurring in Hawaiian Waters near Dillingham Military Reservation Region of Influence

Scientific Name	Common Name	<sup>1</sup> Federal Status	<sup>2</sup> State Status	Habitat	Date Last Observed	Likelihood of Occurrence	Notes
<b><i>Cetaceans and Pinnipeds</i></b>							
<i>Balaenoptera acutorostrata</i>	Minke whale	*	-	May occur in nearshore or offshore waters	Known Currently	U	Most common northwest of the main seven-island chain or on leeward side of islands. May be incidentally sighted in waters adjacent to DMR.
<i>B. borealis</i>	Sei Whale	E*	-	Most likely in deeper offshore waters	Known currently	U	Rarely sighted in Hawaiian waters.
<i>B. edeni</i>	Bryde's whale	*	-	May occur in nearshore or offshore waters	Known Currently	U	Most common northwest of the main seven-island chain. May be incidentally sighted in waters adjacent to DMR.
<i>B. musculus</i>	Blue whale	E*	-	Most likely in deeper offshore waters	Known currently	U	Heard in Hawaiian waters.
<i>B. physalus</i>	Fin whale	E*	-	Most likely in deeper offshore waters	Known currently	U	Heard but rarely sighted in Hawaiian waters.
<i>Berardius bairdii</i>	Baird's beaked whale	*	-	Most likely in deeper offshore waters	Known Currently	P	May be incidentally sighted in waters adjacent to DMR.
<i>Delphinus Delphis</i>	Common dolphin	*	-	Most likely in deeper offshore waters	Known Currently	U	May be incidentally sighted in waters adjacent to DMR.
<i>Eubalaena glacialis</i>	Pacific right whale	E*	-	Unknown if depth is a criteria	Known currently	U	Most likely stray individuals from more northern population.
<i>Feresa attenuate</i>	Pygmy killer whales	*	-	May occur in nearshore or offshore waters	Known Currently	C	Occasionally seen in the channels between the main islands. Has been documented off the coast of O'ahu.
<i>Globicephala macrorhynchus</i>	Short-finned pilot whale	*	-	May occur in nearshore or offshore waters	Known Currently	C	Occasionally seen in the channels between the main islands. Common in nearshore or offshore areas in waters adjacent to DMR.
<i>Grampus griseus</i>	Risso's dolphin	*	-	Most likely in deeper offshore waters	Known Currently	U	More common sighted offshore. May be seen in offshore areas in waters adjacent to DMR.
<i>Kogia breviceps</i>	Pygmy sperm whale	*	-	Most likely in deeper offshore waters	Known Currently	P	Prefers deeper waters but occasionally seen in the channels between the main islands. May be incidentally sighted in waters adjacent to DMR.
<i>K. simus</i>	Dwarf sperm whale	*	-	Most likely in deeper offshore waters	Known Currently	P	Prefers deeper waters but occasionally seen in the channels between the main islands. May be incidentally sighted in waters adjacent to DMR.



**Table 6-18**  
**Sensitive Marine Wildlife Occurring or Potentially Occurring in Hawaiian Waters near Dillingham Military Reservation Region of Influence** *(continued)*

Scientific Name	Common Name	<sup>1</sup> Federal Status	<sup>2</sup> State Status	Habitat	Date Last Observed	Likelihood of Occurrence	Notes
<i>Monachus schauinslandi</i>	Monk seal	E*, CH, D	-	More common in nearshore waters or hauled out on the coast.	Known currently	C	Most common northwest of the main seven-island chain. Incidental individuals may haul out along the coast of the islands' north shores. Anecdotal sighting on DMR beach.
<i>Megaptera novaeangliae</i>	Humpback whale	E*	-	May occur in nearshore or offshore waters	Known currently	C	Occurs throughout the main seven-island chain January through April. Occurs in waters adjacent to the islands' north shores.
<i>Mesoplodon densirostris</i>	Blainsville's whale	*	-	Most likely in deeper offshore waters	Known Currently	C**	Prefers deeper offshore waters but has been sighted off coast of O'ahu.
<i>Orcinus orca</i>	Killer whale	*	-	May occur in nearshore or offshore waters	Known Currently	C**	Occasionally seen, especially in the channels between the main islands and at the northwest island chain. May be incidentally sighted in nearshore or offshore waters adjacent to DMR.
<i>Peponocephala electra</i>	Melon-headed whale	*	-	May occur in nearshore or offshore waters	Known Currently	C**	Occurs especially in the channels between the main islands and at the northwest island chain. May also occur in nearshore or offshore areas adjacent to DMR.
<i>Physeter macrocephalus</i>	Sperm whale	E*	-	Most likely in deeper offshore waters	Known currently	U	Most common off the north and eastern shores of the main seven islands. May be sighted in waters adjacent to the islands' north shores.
<i>Pseudorca crassidens</i>	False killer whale	*	-	May occur in nearshore or offshore waters	Known Currently	C**	Occasionally seen in the channels between the main islands. May be sighted in nearshore or offshore waters adjacent to DMR.
<i>Stennella attenuata</i>	Spotted dolphin	*	-	Most likely in nearshore, leeward coastal waters	Known Currently	C	Common along the coastline, especially on the leeward sides of the island. Occurs in nearshore or offshore areas in waters adjacent to DMR.
<i>S. coeruleoalba</i>	Striped dolphin	*	-	May occur in nearshore or offshore waters	Known Currently	P	More strandings sighted than live individuals.
<i>S. longirostris</i>	Spinner dolphin	*	-	Most likely in nearshore, leeward coastal waters	Known Currently	C	Common along the coastline. Occurs in nearshore or offshore areas in waters adjacent to DMR.
<i>Steno bredanensis</i>	Rough toothed dolphin	*	-	Most likely in deeper offshore waters	Known Currently	C**	Prefers deeper offshore waters but has been sighted off coast of O'ahu.

**Table 6-18**  
**Sensitive Marine Wildlife Occurring or Potentially Occurring in Hawaiian Waters near Dillingham Military Reservation Region of Influence** *(continued)*

Scientific Name	Common Name	<sup>1</sup> Federal Status	<sup>2</sup> State Status	Habitat	Date Last Observed	Likelihood of Occurrence	Notes
<i>Tursiops truncatus</i>	Bottlenose dolphin	*	-	May occur in nearshore or offshore waters	Known Currently	C	Common along the coastline. Occurs in nearshore or offshore areas in waters adjacent to DMR. Also common offshore in project area waters.
<i>Ziphius cavirostris</i>	Cuvier's beaked whale	*	-	Most likely in deeper offshore waters	Known Currently	C**	Most common of the beaked whales in project area waters. Prefers deeper offshore waters but can be common in nearshore or offshore areas in waters adjacent to DMR.
<b><u>Sea Turtles</u></b>							
<i>Caretta caretta</i>	Loggerhead turtle	T	-	In project area; prefers nearshore waters	Known currently	U	Considered uncommon in DMR waters.
<i>Chelonia mydas</i>	Green turtle	T	-	In project area; prefers nearshore waters	Known currently	C	Nests annually on Hawaiian beaches; common in nearshore areas of any of the main seven islands. Most abundant sea turtle in DMR waters.
<i>Dermochelys coriacea</i>	Leatherback turtle	E	-	In project area; prefers offshore waters	Known currently	C	Primarily occurs over deep oceanic waters; sighted equally as frequently off any of the main seven islands.
<i>Eretmochelys imbricata</i>	Hawksbill turtle	E	-	In project area; prefers nearshore waters	Known currently	U	Considered uncommon; a small number nest on the island of Hawai'i.
<i>Lepidochelys olivacea</i>	Olive ridley turtle	T	-	In project area; prefers offshore waters	Known currently	U	Infrequently seen in Hawaiian offshore waters.

Sources: NMFS 2000a-bb; ONR 2000.

**Status:**

**<sup>1</sup>Federal:**

E = Endangered

\* = Protected under MMPA

D = Depleted under the MMPA

CH = Critical habitat designated or proposed for designation

\*\* = presence confirmed from aerial surveys but found at a distance offshore from the DMR coastline, so discussed in Appendix rather than text.

**<sup>2</sup>State**

/-/ = No Status

**Likelihood of occurrence in the project site**

C = Confirmed

P = Potentially may occur

U = Unlikely to occur

Whales and Dolphins Potentially Occurring in Hawaiian Waters of the Dillingham Military Reservation Region of Influence

Non-ESA listed but MMPA protected marine mammals considered to have the potential to be found in Hawaiian waters, or in waters off the DMR ROI, include the following:

- Bryde's whales (*Balaenoptera edeni*);
- Minke whales (*B. acutorostrata*);
- Pygmy sperm whales (*Kogia breviceps*);
- Dwarf sperm whales (*K. simus*);
- Killer whales (*Orcinus orcina*);
- False killer whales (*Pseudorca crassidens*);
- Pygmy killer whales (*Feresa attenuate*);
- Pilot whales (*Globicephala macrorhynchus*);
- Beaked whale species (*Mesoplodon* and *Ziphius* spp.);
- Baird's beaked whale (*Berardius bairdii*);
- Melon-headed whales (*Peponocephala electra*);
- Bottlenose dolphins (*Tursiops truncatus*);
- Spinner dolphins (*Stenella longirostris*);
- Rough-toothed dolphins (*Steno bredanensis*);
- Risso's dolphin (*Grampus griseus*);
- Striped dolphin (*Stenella coeruleoalba*);
- Common dolphin (*Delphinus delphis*); and
- Several species of spotted dolphins, the most common of which is *Stenella attenuata*.

The natural history of these species, as well as specific documented locations either in or near the DMR ROI (if known), are described in Appendix I-1. (Note: As marine mammals are mobile and rapid movers, if they have been documented near the DMR ROI [within 2 to 5 nautical miles], they are assumed to occur in the ROI).

Most of the species listed above are not expected to occur in the DMR ROI, with the exception of the humpback whale and several of the dolphin species.

**Sensitive Species**

Sensitive species include special status, or regulated, species such as USFWS or State of Hawai'i listed endangered, threatened, candidate, or proposed species; MMPA species; federal and state species of special concern; and locally regulated species. Also considered sensitive are rare species that have had rapid population decline or whose habitat has markedly decreased in recent years. Potential sensitive species on DMR were identified by the State of Hawai'i DLNR (HDLNR 2002a), USARHAW biologists and surveys, and the Hawai'i Natural Heritage Program (HINHP 1994).

A list of all sensitive vegetation and wildlife and any critical habitat found in the region, according to USFWS and DLNR records, is found in Tables 6-19 and 6-20. An assessment of the likelihood of a species occurring on DMR was made, where possible, based on the habitat requirements and geographic distribution of the species, on-site habitat quality, and the results of biological surveys of DMR. Natural history descriptions of sensitive species with the potential to occur in the ROI, and specific locations if known, can be found in Appendix I-1 (Recovery Plans 1-1a; Plants I-1b; Wildlife I-1c).

### Sensitive Plant Species

The rare plants found on DMR outside of the ROI include federal species of concern, candidates for federal listing, and state-ranked rare plants. *Bobea sandwicensis*, *Hibiscus brackenridgei* ssp. *mokuleianus*, *H. kokio* spp. *kokio*, and *Schiedea kealiae* are all sensitive species with the potential to occur within the ROI. The remaining native ecosystems near or adjacent to the ROI have low densities of native species and are fragmented and disturbed. A 1977 survey found unique populations of *Lonomea* and *Reynoldsia sandwicensis* near the base of the cliffs. Though not endangered, these species are rare and represent the only example of closed canopy *Sapindus oahuensis* forest known in the world.

Sensitive plants and their likelihood of occurrence in the DMR ROI are shown in Table 6-19.

### Sensitive Wildlife Species

The following discussion includes a profile of sensitive wildlife species considered likely to be found in the project area. This information is primarily based on information from the O'ahu INRMP (USARHAW and 25<sup>th</sup> ID[L] 2001a), the ESMRP (R. M. Towill Corp 1997b), and the Biological Inventory of DMR (HINHP 1994). The first extensive zoological surveys of DMR were conducted in 1976 and 1977 (Shallenberger and Vaughn 1978). More recent studies were conducted in 1995 by HINHP, in search of rare and sensitive species on DMR, and by PCSU natural resource staff in 2000 and 2001. The latest USFWS and HINHP survey information on species and habitat in the SBCT ROI has been incorporated into this evaluation of biological resources. Table 6-20 lists sensitive terrestrial wildlife and their potential to occur in the DMR ROI. Figure 6-18 shows the documented locations of sensitive terrestrial wildlife recorded in the DMR ROI.

### Marine Wildlife

Six species of endangered whales occur in the Pacific tropical waters of Hawai'i. Only one of these is considered likely to occur in the waters adjacent to DMR (in the DMR ROI), the humpback whale (*Megaptera novaeangliae*). The other listed species are the fin (*Balaenoptera physalus*), blue (*Balaenoptera musculus*), sei (*Balaenoptera borealis*), and Pacific right (*Eubalaena glacialis*), and sperm whale (*Physeter macrocephalus*).

There is one federally listed endangered seal, the monk seal (*Monachus schauinslandi*), which is considered to have the potential to occur. The monk seal has critical habitat in the northwestern portion of the Hawaiian Island chain, which is outside of the ROI.

**Table 6-19**  
**Sensitive Plant Species Occurring or Potentially Occurring at DMR ROI**

Scientific Name	Hawaiian Name/Common Name	Federal <sup>1</sup> Status	State <sup>2</sup> /Global <sup>3</sup> Status	Habitat	Date Last Observed	Likelihood of Occurrence
<i>Bobea sandwicensis</i>	‘ahakea/-	-	-/G2	Ridges and gulch slopes of dry to moist lowland forests	Unknown	P
<i>Cyperus trachysanthos</i>	pu‘uka‘a/-	E, CH	-/G1	Wet slopes and pond margins in lowland areas	Unknown	P
<i>Hibiscus brackenridgei</i> ssp. <i>mokuleianus</i>	Koki‘o ke‘oke‘o, ma‘o hau helema‘o hau hele, ma‘o hau helema‘o hau hele/-	E, CH	-/G1	Lowland dry forests	Unknown	P
<i>H. kokio</i> spp. <i>kokio</i>	koki‘o ‘ula‘ula/-	SOC	-/ G2	Wet or dry forests adjacent to DMR	2000	P
<i>Lepidium bidentatum</i> var. <i>o-waibiense</i>	‘ānaunau, naunau, kūnānā/-	SOC	-/-	Steep dry coastal slopes in low elevations	Unknown	P
<i>Lipochaeta remyi</i>	nehe/-	SOC	-/G1	Wet sites in dry forests	Unknown	P
<i>Nototrichium humile</i>	kulu‘ī/-	E, CH	-/G2	Dry forest understory and cliff faces	Unknown	P
<i>Schiedea kealiae</i>	NCN	E, CH	-/G1	Dry cliff faces and steep slopes	2000	P

Sources: USFWS 2002a; USARHAW and 25th ID [L] 2001a; PCSU 2000

Notes:

NCN = No Common Name

Status:

**<sup>1</sup>Federal:**

E = Endangered

SOC = Species of concern

CH = Critical habitat designated or proposed for designation

**<sup>2</sup>State**

/-/- = No Status

**<sup>3</sup>Heritage Global Rank:**

G1 = Species critically imperiled globally (typically 1-5 current occurrences)

G2 = Species imperiled globally (typically 6-10 current occurrences)

**Likelihood of occurrence on the project site**

C = Confirmed

P = Potentially may occur

**Table 6-20**  
**Sensitive Terrestrial Wildlife Species Occurring or Potentially Occurring at Dillingham Military Reservation Region of Influence**

Scientific Name	Hawaiian Name/ Common Name	Federal <sup>1</sup> Status	State <sup>2</sup> /Global <sup>3</sup> Status	Habitat	Date last observed	Likelihood of Occurrence
<b>Invertebrates</b>						
<i>Megalagrion xanthomelas</i>	-/orange-black damselfly	C	-/G2	Breeds in coastal wetlands, perennial streams, reservoirs, ponds.	2000	U*
<b>Birds</b>						
<i>Anas nyroilliana</i>	koloa maoli/Hawaiian duck	E	E/G1	Lowland marshes, reservoirs, taro patches, pastures, drainage ditches, agricultural lands below 1,000 feet (305 meters), stream and river valleys in densely wooded areas at higher elevations, mountain pools, mountain bogs, forest swamps, natural and human-made ponds, wetlands. Nests on ground near water in well-concealed site, primarily on small islets.	1995	C^
<i>Asio flammeus sandwichensis</i>	pueo/Hawaiian short-eared owl	SOC, +	E**/G5T3	Pastures, grasslands, dry and wet forests that are dominated by either native or nonnative vegetation, sea level to 7,900 feet (2,408 meters).	Unknown	P
<i>Chasiempis sandwichensis ibidis</i>	O'ahu 'elepaio/-	E, CH	E/G4T1	Native Hawaiian forest.	Unknown	P
<i>Fulica alai</i>	'alae ke'oke'o/Hawaiian coot	E	E/G2	Herbaceous wetland, lagoon, river mouth/tidal river, low gradient, pool, shallow water, herbaceous wetland.	1995	C^
<i>Gallinula chloropus sandvicensis</i>	'alae'ula/Hawaiian common moorhen	E	-/-	Freshwater marshes, taro patches, reedy margins of water courses, reservoirs, wet pastures.	Unknown	C^
<i>Himantopus mexicanus knudseni</i>	ae'o/black-necked stilt	E	-/G5T2	Shallow salt or freshwater with soft muddy bottom; grassy marshes, wet savanna, mudflats, shallow ponds, flooded fields, borders of salt ponds and mangrove swamps. Nests along shallow water of ponds, lakes, swamps, or lagoons. May nest on the ground or in shallow water on a plant tussock.	Unknown	C^
<i>Paroreomyza maculata</i>	'alauahio/O'ahu creeper	E	E/G1	Native Hawaiian shrublands, forests, bogs.	Unknown	U
<i>Vestiaria coccinea</i>	'i'iwi/Hawaiian honeycreeper	+	E/G4	Native forests, especially 'ohi'a ( <i>Metrosideros</i> ) forest.	Unknown	U

**Table 6-20**  
**Sensitive Terrestrial Wildlife Species Occurring or Potentially Occurring at Dillingham Military Reservation Region of Influence** *(continued)*

Scientific Name	Hawaiian Name/ Common Name	Federal <sup>1</sup> Status	State <sup>2</sup> /Global <sup>3</sup> Status	Habitat	Date last observed	Likelihood of Occurrence
<b>Mammals</b>						
<i>Lasiurus cinereus semotus</i>	-/Hawaiian hoary bat	E	E/G5T2	Bare rock, cliff, hardwood forest, grassland/herbaceous, hardwood woodland, riparian habitats.	Unknown	P

Sources: USARHAW and 25<sup>th</sup> ID(L) 2001a; HDLNR 2002a; HINHP 1994; R. M. Towill Corp. 1997b; NatureServe 2001; Virginia Tech 1998; PCSU 2001

Notes::

NCN = No Common Name

\*The species record is based on an attempted reintroduction, which subsequently failed. This species has not been identified in this location since.

\*\*The state endangered listing refers only to the populations on O'ahu, Lana'i, and Moloka'i.

^These four waterbirds have been documented at DMR, however, there have been extensive surveys for them and it has been determined that they are not resident species.

**<sup>1</sup>Status:**

**<sup>1</sup>Federal:**

E = Endangered  
 SOC = Species of concern  
 C = Candidate  
 /-/ = No Status  
 + = Birds of Conservation Concern

**<sup>3</sup>Heritage Global Rank:**

G1 = Species critically imperiled globally (typically 1-5 current occurrences).  
 G2 = Species imperiled globally (typically 6-10 current occurrences).  
 G4 = Species apparently globally secure.  
 G5 = Species demonstrably globally secure.  
 T1 = Subspecies critically imperiled globally (typically 1-5 current occurrences).  
 T2 = Subspecies imperiled globally (typically 6-10 occurrences).  
 T3 = Subspecies either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range, or because of other factors making it vulnerable to extinction throughout its range (21-100 occurrences).

**<sup>2</sup>State**

E= Endangered  
 /-/ = No Status

**Likelihood of occurrence on the project site**

C = Confirmed  
 P = Potentially may occur  
 U = Unlikely to occur

[Figure 6-18](#)

Sensitive Wildlife Species in the Dillingham Military Reservation Region of Influence



There are five listed sea turtles that could occur in the Pacific tropical waters of Hawai'i, two of which are more common and could occur in the DMR ROI. These are the green sea turtle (*Chelonia mydas*), which is federally threatened, and the leatherback sea turtle (*Dermochelys coriacea*), which is federally endangered. The green sea turtle is expected to occur in the ROI. The leatherback turtle could occur but most likely would not because it prefers offshore waters. Adult leatherbacks are commonly sighted in the waters off the outer Hawaiian Islands (NOAA Fisheries 2000z). The loggerhead (*Caretta caretta gigas*), hawksbill (*Eretmochelys imbricata*), and olive ridley (*Lepidochelys olivacea*) are not expected to occur. Hawksbills and green sea turtles nest annually on Hawaiian beaches (ONR 2000), though no nests for either species have been documented in the ROI, and no hawksbills are expected to occur there. This species is considered uncommon in Hawaiian waters, but does have nesting sites on Hawai'i and Moloka'i (NOAA Fisheries 2000y), which are distant from the ROI. Loggerheads and olive ridleys are known to occur in Hawaiian waters as they occur as bycatch in the longline fishery, but they are pelagic (open sea) species and as such are not expected in the DMR ROI. Loggerheads are known to spend 40 percent of their time at the surface, and olive ridleys are only at the surface 20 percent of the time and tend to be found in shallower waters than loggerheads (Polovina et al. 2000). Olive ridleys are the most abundant sea turtles in the world (Polovina et al. 2000), though they are less common in Hawaiian waters. Most records of olive ridley are from entanglements and strandings (NOAA Fisheries 2000aa).

#### Humpback Whale (FE/MMPA)

The waters off the coasts of the Hawaiian Islands are known for their seasonal population of humpback whales, which are also the most abundant marine mammal throughout the Hawaiian waters (Mobley et al. 2001). The Hawaiian Islands are an important breeding ground for this species (Calambokidis et al. 1998). The humpback whale is the only one of the five endangered baleen whales potentially occurring in Hawaiian waters that is known to be present in reasonably large numbers. The International Whaling Commission and NOAA Fisheries consider the Hawaiian population of humpbacks to be a separate stock (NOAA Fisheries 2000a). Humpback whales are found throughout the island chain and are most abundant in coastal waters of the main Hawaiian Islands, including Hawai'i and O'ahu, from November through April, with peak abundance from late February through mid-March (Baker and Herman 1981). Approximately two-thirds of the entire North Pacific humpback whale population (approximately 4,000 to 5,000) migrate to Hawaiian waters to breed, calve, and nurse (NOAA Fisheries 2000a). These whales are generally found in shallow waters shoreward of the 600-foot (183-meter) depth contour (ONR 2000).

Humpback whale mothers and calves prefer the calmer shallower waters often found on the leeward sides of the islands (Smultea 1992), and they prefer very shallow water less than 60 feet (18 meters) (ONR 2000; Smultea 1992). Some research suggest that habitat use patterns of females and calves in nearshore areas may decrease as a result of increasing vessel traffic and human activities (ONR 2000). Humpback whales are vulnerable to human disturbance in Hawaiian waters and possibly to vessel strikes. Hawai'i regulations prohibit boats from approaching within 100 yards (91 meters) of adult whales and within 300 yards (274 meters) of mother/calf pairs. Humpback whales (of varying pod sizes and types, including mother and calf pods) are commonly sighted off the O'ahu coast and are confirmed in project area

waters, though with unknown frequency, from January through April (Pickering 2003; Clark and Tyack 1998).

#### Monk Seal (*E/MMPA,D*)

The monk seal is the only pinniped (seal species) known to occur in the Hawaiian archipelago, where it is endemic. This species may occasionally occur in the waters or shore of the ROI, but it is more common in the northwest island chain. Incidental transients are known at all of the main seven islands and there is a small uncounted population on the island of Ni'ihau (NOAA Fisheries 2000w). The species was designated as depleted under the MMPA in 1976, following a large decline in animal counts from the late 1950s and mid 1970s. The monk seal was also listed as endangered under the ESA in 1976. In 1988, NOAA Fisheries designated critical habitat for the Hawaiian monk seal, but this habitat is quite distant from the ROI, in the northwestern Hawaiian Islands, extending from shore to a distance offshore that is 20 fathoms (180 feet, or 55 meters) deep. The species is managed as one stock, though each island may in fact have its own subpopulations (NOAA Fisheries 2000w). Virtually nothing is known about its distribution and movement patterns when it is at sea. Current estimates indicate that the monk seal population is declining and is believed to include approximately a thousand animals. Hawaiian monk seals breed primarily at Laysan Island, Lisianski Island, and Pearl and Hermes Reefs but also are known to use the Midway Islands, among other northwest Hawaiian Islands (NOAA Fisheries 2000w).

#### Green sea turtle (*FT*)

The green sea turtle is considered the most abundant turtle in Hawaiian waters (Zug et al. 2002; ONR 2000; NOAA Fisheries 2000x-z, 2000aa, 2000bb). The Hawaiian population of nesting green sea turtle makes up a distinct genetic unit (Zug et al. 2002). Except during their post-hatching pelagic phase, this species spends most of its time in coastal waters, shallow bays, and nearshore areas where foraging is optimal (Brill et al. 1994; Zug et al. 2002). Juveniles and subadult green turtles are especially abundant in the nearshore areas. These turtles have nested on all of the seven main islands (Dollar 1999). The most accurate abundance estimates for adult female green turtles, which nest annually on Hawaiian beaches, are from 450 to 475 animals, with reproduction taking place mostly at the French Frigate Shoals (Balazs 1980; NOAA Fisheries 2000x, 2000y). Submergence intervals vary by behavior. When the animals are resting, they have regular, long submergence intervals. When feeding, submergence intervals are short and irregular (Brill et al. 1994). In Hawaii, 40 to 60 percent of immature green sea turtles suffer from fibropapillomatosis, a disease that causes tumor growth (Work et al. 2003). Studies are ongoing to assess the impacts of these tumors on the animals' behavior.

Green sea turtles are expected to occur in the ROI, in waters off DMR or on the beach. This species is known to feed on marine plants that occur in the ROI and in the nearshore areas at DMR. The DMR ROI could serve as sea turtle foraging and resting areas. Green sea turtles have been shown from some Hawaiian areas to remain within a small portion of a habitat area, if foraging and rest habitat is optimal there, and to have short submergence intervals (Brill et al. 1994). During the breeding season, adult green sea turtles undertake long-distance oceanic migrations from feeding areas throughout the Hawaiian archipelago to nesting beaches at French Frigate Shoals, Laysan Island, Lisianski Island, Pearl Reef and

Hermes Reef, Cure Atoll, and Midway Island. Ninety percent of green turtle nesting in the Hawaiian Islands occurs far from the ROI at the French Frigate Shoals, the portion of the islands that is 800 miles (1,482 kilometers) northwest of the main Hawaiian Islands and consisting of a string of 11 small island regions.

#### Leatherback sea turtle (FE)

Leatherbacks do not nest regularly or in great numbers in the Hawaiian Islands (NOAA Fisheries 2000x, 2000aa). Adult leatherbacks are commonly sighted in the Pacific Ocean near the Hawaiian archipelago, primarily over deep oceanic waters. Leatherbacks could occur equally as frequently off any of the main seven islands, but they are often sighted off the north shores of both O'ahu and the island of Hawai'i (NOAA Fisheries 2000z; ONR 2000). They are considered unlikely in ROI waters, as they are more typically sighted along the north shore or in offshore waters (NOAA Fisheries 2000z). However, transients could occur in the waters off DMR and, rarely, on the coastline.

Of these marine mammals, the only likely occurrence in the ROI would be the humpback whale, the monk seal, and the green sea turtle. Table 6-18 lists the likelihood of occurrence of these species within the project area and associated habitat and regulatory information. The natural history of these species, as well as specific documented locations either in or near the DMR ROI (if known), are described in Appendix I-1. (Note: As marine mammals are mobile and rapid movers, if they have been documented near the DMR ROI [within 2 to 5 nautical miles], they are assumed to occur in the ROI.)

### ***Sensitive Habitats***

#### Critical Habitat

Army lands were excluded from the latest critical habitat designations for plants based on the essential contribution that Army-led natural resource conservation actions play in the stabilization of threatened and endangered species. Small portions of ~~There is no USFWS critical habitat may occur within the DMR ROI.~~

#### Hawaiian Islands Humpback Whale National Marine Sanctuary

The Hawaiian Islands Humpback Whale National Marine Sanctuary was designated under the National Marine Sanctuaries Act (16 U.S.C. 1431 et seq., P.L. 106-513). This act was passed to designate and manage areas of the marine environment with special national significance as National Marine Sanctuaries. The primary objective of this law is to protect marine resources. The act also directs the Secretary of Commerce to facilitate all public and private uses of those resources that are compatible with the primary objective of resource protection. Sanctuaries are managed according to site-specific management plans prepared by the NOAA Fisheries. The sanctuary waters are composed of five separate areas abutting six of the major islands. Designated sanctuary waters encompass marine waters in north O'ahu near, but not adjacent to, the Dillingham ROI. Designated sanctuary waters also occur outside of O'ahu at Penguin Banks (see Figure 3-13).

#### Biologically Significant Areas

Classifications of BSAs are defined in Section 5.10-1.

- BSA1: On DMR, Lonomea lowland dry forest is classified as a BSA1 rare natural community, with Global Heritage Ranking G2.
- BSA2: There is one BSA2 area on DMR, adjacent to the BSA1 area and in the southern portion of DMR in an area of sloping cliffs.
- BSA3: There are no BSA3 areas in DMR.

A wetland delineation of DMR was conducted in the spring and summer of 2002 following procedures outlined in the ACOE 1987 wetland delineation manual; results were published in a report dated August 2002 (USACE 2002d). Those conducting the survey identified one jurisdictional wetland on DMR (USACE 2002d). The wetland is spring fed, is dominated by primrose willow, and is approximately 287 square yards (240 square meters) (USACE 2002d). This perched wetland is within the ROI but outside of the area that will be used for maneuver training.

An additional wetland area was investigated at DMR. Based on an evaluation by the Corps of Engineers, Honolulu District, Regulatory Branch, dated September 4, 2002, the wetland area was determined to be non-jurisdictional and, therefore, not regulated under Section 404 of the Clean Water Act. (See Appendix E).

### 6.10.2 Environmental Consequences

In response to the agency and public comments received during the Draft EIS comment period we reevaluated our analysis of the biological resources. As a result of considering these comments and a reanalysis of the available information, we recognize that the impact to biological resources from fire could not be mitigated to the less than significant level. However, these impacts will be substantially reduced as a result of mitigation.

This section identifies potential biological impacts that may result from the Proposed Action, Reduced Land Acquisition, and No Action. The methodology and significance criteria used to determine the level of impact on biological resources are described in Section 4.10.1.

The Army and USFWS have not yet agreed on a final ROI. Changes to the present ROI, depicted in Figure 6-15, could alter the qualitative and quantitative analyses within this environmental consequences section.

#### **Summary of Impacts**

Impacts on biological resources would occur as a result of fire if it occurs, construction, the elevated use of areas by Soldiers and the intensification of training including off-road mounted maneuvers, and the increase in nonlive-fire training. All biological resources have been assessed for potential impacts from project activities. For a full description of the impact methodology used to determine impact on a resource please refer to chapter 4.10. Only the resources potentially affected are included in this chapter. If a resource was determined not to be impacted, it has not been included for discussion. A summary of impacts is provided in Table 6-21.

Significant impacts mitigable to less than significant are fire effects on sensitive species and sensitive habitat; impacts from construction and training activities on sensitive species and habitat; and impacts on sensitive species and habitat from the spread of nonnative species. Less than significant impacts involve impacts from training activities and construction on general habitat and wildlife at DMR and along Dillingham Trail, threats to migratory birds from FTI construction, and noise and visual impacts on wildlife.

**Table 6-21**  
**Summary of Potential Biological Impacts at DMR**

Impact Issues	Proposed Action	Reduced Land Acquisition	No Action
Impacts from fire on sensitive species and sensitive habitat.	⊗	⊗	⊗
Impacts from construction and training activities on sensitive species and sensitive habitat.	⊗	⊗	⊗
Impacts from the spread of nonnative species on sensitive species and sensitive habitat.	⊗	⊗	⊗
Impacts from construction and training activities on general habitat and wildlife.	⊙	⊙	⊙
Threat to migratory birds.	⊙	⊙	⊙
Noise and visual impacts.	⊙	⊙	⊙
Runoff impacts on marine wildlife and coral ecosystems.	○	○	○

**LEGEND:**

⊗ = Significant	+	= Beneficial impact
⊗ = Significant but mitigable to less than significant	N/A	= Not applicable
⊙ = Less than significant		
○ = No impact		

***Proposed Action (Preferred Alternative)***

***Significant but Mitigable to Less than Significant Impacts***

*Impact 1: Impacts from fires on sensitive species and sensitive habitat.* Although no live-fire exercises are proposed at DMR, human-induced fires could occur as a result of the Proposed Action. Sources of fire include engines, pyrotechnics, nonlive fire, and cigarettes. Fires are a great threat to the natural communities in Hawai'i and could cause major impacts on biological resources, as discussed extensively in Section 5.10.2 of this report. Construction, training, and use of the Dillingham Trail would increase the threat of wildfire in the Wai'anāe Mountains. The rugged terrain can limit the suppression and control of fires, which are likely to spread unchecked into areas that contain sensitive species.

Vegetation communities that could be affected by the spread of fire include those within the DMR ROI, such as those that follow:

- Nonnative vegetation (approximately 6,847 acres [2,771 hectares]);
- Lowland dry forest and shrubland (approximately 29 acres [11.7 hectares]);
- Coastal dry shrubland and grassland (approximately 56 acres [22.6 hectares]); and
- Lowland mesic forest and shrubland (approximately 194 acres [78.5 hectares]).

Impacts of fire on vegetation communities are discussed in Section 5.10.2 and could include the following:

- Removal of aboveground biomass;
- Soil erosion;
- Changes in community composition resulting from changes in soil texture and composition, moisture, light availability, and nutrient availability; and
- Invasion of nonnative species.

Federally listed and sensitive species have the potential to occur in the southern portion of the DMR ROI, on the northern edge of the Waiʻanae Mountains (Tables 6-19 and 6-20). These species could be adversely affected by the spread of fire into their habitats. Approximately 14 acres (5.6 hectares) of BSAs also occur within the DMR ROI and could be affected in the event that a wildland fire occurred at DMR.

The Proposed Action would not directly affect threatened or endangered species, but, due to the risk of fire ignition associated with military activities, the disturbance or destruction of federally listed species resulting from a wildland fire is considered a potentially significant and mitigable impact.

To help prevent the ignition and spread of fire, the Army would follow guidelines in the *IWFMP, Oʻahu and Pōhakuoloa Training Areas*. This includes the construction of two firebreak roads at DMR and would help prevent the spread of training-induced fires. The mitigation measures listed below would decrease the impacts of fire on sensitive species from construction and the increased use of the DMR military vehicle trail to less than significant levels.

Regulatory and Administrative Mitigation 1. The Army will implement the terms and conditions identified in the Biological Opinion for current force and SBCT proposed training on the island of Oʻahu including the development and implementation of the Oʻahu Implementation Plan to aid in the stabilization of listed species. The BO is available upon request.

The Integrated Wildland Fire Management Plan for Pōhakuoloa and Oʻahu Training Areas was updated on October 2003. The Army will fully implement this plan for all existing and

new training areas to reduce the impacts associated with wildland fires. The plan is available upon request.

Additional Mitigation 1. No additional mitigation measures were identified for this impact.

Impact 2: Impacts from construction and training activities on sensitive species and sensitive habitat. The Proposed Action would have a significant but mitigable impact on sensitive species and sensitive habitat.

The effects of fire, as described in Impact 1, would have the most significant impacts on listed species and their habitat. Federally listed and sensitive species are known to occur or have the potential to occur in the southern portion of the DMR ROI (Figures 6-17). This includes the Hawaiian common moorhen, Hawaiian duck, Hawaiian coot, the black-necked stilt, the Hawaiian hoary bat, *Hibiscus brackenridgei* ssp. *mokuleianus*, *Schiedea kealiae*, and *Nototrichium humile*. These species would be adversely affected by the spread of fire into their habitats. (The Army has surveyed for bird species listed above annually over the last nine years but none have been identified as occurring on DMR during this time.)

Impacts from noise associated with use of the Dillingham trail would affect sensitive waterfowl if any were present in the project area.

Regulatory and Administrative Mitigation 2. The Army will implement all the terms and conditions defined in the Biological Opinions issued by USFWS for current force and SBCT proposed actions on the islands of O'ahu and Hawai'i. The terms and conditions which implement the reasonable and prudent measures determined during this consultation will be incorporated into the proposed action. These measures will help avoid effects and compensate for impacts on listed species that would result directly and indirectly from implementation of the proposed action. The Biological Opinions are available upon request.

The Army will implement land management practices and procedures described in the ITAM annual work plan to reduce erosion impacts (US Army Hawai'i 2001a). Currently these measures include: implementation of a training requirement integration (TRI) program; implementation of an Integrated Training Area Management (ITAM) program; Sustainable Range Awareness (SRA) program; development and enforcement of range regulations; implementation of an Erosion and Sediment Control Management Plan; coordinating with other participants in the Koolau Mountains Watershed Partnership (KMWP); and continued implementation of land rehabilitation projects, as needed, within the Land Rehabilitation and Maintenance (LRAM) program. Examples of current LRAM activities at KTA include: revegetation projects involving site preparation, liming, fertilization, seeding or hydroseeding, planting trees, irrigation, and mulching; a combat trail maintenance program (CTP); coordination through the Troop Construction Coordination Committee (TCCC) on road maintenance projects; and development of mapping and GIS tools for identifying and tracking progress of mitigation measures.

Additional Mitigation 2: The Army proposes to fence or flag where practicable any sensitive plant communities from activities that may take place in the ROI. The Biological Opinions

outline fencing for the majority of the sensitive species. USARHAW will evaluate if additional fencing may be necessary.

Impact 3: Impacts from the spread of nonnative species on sensitive species and sensitive habitat. The construction of Dillingham Trail and its use would introduce more invasive species to the area, which would have both short-term and long-term impacts on sensitive plants and wildlife.

Trail construction would increase the number of people in the area, which would increase the introduction and spread of nonnative species, particularly plant species whose seeds can be easily carried by humans on their shoes, clothing, equipment, and vehicles. Activities associated with Dillingham Trail and activities along this trail could facilitate the spread of nonnative species into the native wiliwili forest and the adjacent rare Lonomea forest. The Lonomea forest supports sensitive species *Schiedea kealiae* (a federally listed plant), 'ahakea, and koki'o.

Invasive plants have an advantage in a stressed environment and can often out-compete native species, which are not adapted to an environment created through human activity. Nonnative species that can survive in a foreign habitat often have evolutionary adaptations that allow them to better withstand human-related effects on the environment and are more tolerant of habitat degradation. These species can spread rapidly throughout a disturbed habitat and, in doing so, alter the habitat and its associated ecosystem. Native wildlife would be drastically affected by the alteration of landscape and vegetative cover, particularly if the native vegetation that they feed on were reduced.

Long-term elevated use of Dillingham Trail resulting from the Proposed Action would lead to long-term increases in the spread of nonnative species at DMR and habitats along the proposed Dillingham Trail. There would be an increase of conventional trucks and Strykers on the roads to DMR and the proposed Dillingham trail. Soil and wind erosion would increase as a result of the introduction of these larger, heavier vehicles and the increase in total vehicles needed to go to and from DMR to support the elevated training. (See section 6.9) The Proposed Action would increase the likelihood of a fire in the ROI, as detailed in Impact 1. Nonnative species often benefit from fires, due to their ability to colonize areas following a burn. Also, the presence of nonnative species often provides fuel for wildfires, makes fires larger, and facilitates the spread of fire.

Changes in vegetation can also adversely affect wildlife at sensitive times of their lifecycles by altering elements that they depend on, such as shelter. The threat of animals introduced into the areas surrounding the military vehicle trail by construction and use of the Dillingham Trail is considered low due to the relative absence of risk factors. The airport at DMR is mainly used recreationally by gliders and is not used regularly for inter-island or international transportation. This means there is a low risk that nonnative species will be brought directly to DMR from outside the state, and therefore introduction of vector species and material is not likely. The Proposed Action would not be expected to affect the populations of feral ungulates or other nonnative mammals. However, increased transport of troops among sub-installations and between islands could increase the likelihood of nonnative plants or



invertebrates colonizing new areas. Nonnative invertebrates may be introduced into these areas as a result of construction and increased traffic, which would provide a vector for nonnative species in the area. An example of a potential invasive invertebrate is the black twig borer, which is not currently found in DMR. If this species were introduced there, it would find the host *Bohea* species, which is a commonly available host species for the borer in other locations.

In summary, increasing training at DMR, constructing the Dillingham Trail, increasing the number of people, increasing the number of vehicles, and increasing total usage of the trail could increase the number and type of nonnative plants and animals at DMR, causing an increase in the impact on sensitive species.

Regulatory and Administrative Mitigation 3: As required in the terms and conditions of the Biological Opinions, the Army will:

- Educate soldiers and others potentially using the facilities and roads in the importance of cleaning vehicles, equipment and field gear.
- Educate contractors and their employees about the need to wear weed-free clothes and to maintain weed-free vehicles when coming onto the construction site and to avoid introducing non-native species to the project site.
- Prepare a one-page insert to construction contract bids informing potential bidders of the requirement.
- Inspect and wash all military vehicles at wash rack facilities prior to leaving SBMR, KTA, or PTA to minimize the spread of weeds, such as fountain grass, and animal (invertebrate) relocations.

USARHAW will follow HQDA guidance developed in consultation with the Invasive Species Council and compliance with Executive Order 13112, which determines Federal Agency duties in regards to preventing and compensating for invasive species impacts. USARHAW will agree to all feasible and prudent measures recommended by the Invasive Species Council that would be taken in conjunction with SBCT action to minimize the risk of harm. The Implementation of an Environmental Management System will further improve the identification and reduction of environmental risks inherent in mission activities.

In accordance with USDA regulations and requirements, cargo originating outside of Hawai'i will be inspected by USDA and certified to ensure it is not carrying the brown tree snake or other reptiles before transporting cargo for use on training ranges.

Additional Mitigation 3: The Army proposes to use native plants in any new landscaping or planting efforts where practicable. When practicable, natural habitats would remain intact or adjacent areas would be restored as habitat.

### Less than Significant Impacts

Impacts from construction and training activities on general habitat and wildlife. General SBCT training would occur on established roads or trails, as well as areas designated for maneuver training throughout the installation. Biological resources would not be expected to be affected by maneuvers on existing roads and trails. In addition, the use of the UAV would not be expected to affect biological resources during general operation. No new areas would need to be cleared for the use of the UAV.

As part of the Proposed Action, off-road training using the Stryker vehicle would occur within DMR. Wildlife in these areas would be expected to sustain minor adverse impacts as a result of off-road maneuvers. Wildlife would generally be expected to vacate areas that are being used for off-road maneuvers, but wildlife that do not vacate areas being used for maneuver could sustain injuries. The most likely species to be affected by off-road maneuvers would be ground-nesting birds or small mammals. There are no native ground-nesting birds breeding in the off-road maneuver area, or native small mammals occurring in this area, so the impact on general terrestrial wildlife is considered less than significant.

Off-road training would occur only in previously disturbed areas and would not affect native ecosystems. Approximately 98 percent of the land area at DMR is dominated by nonnative species. The natural communities within the boundary of DMR are two types of lowland dry communities that are on the cliff slopes at the southern end of the training area. These areas would not be used for maneuver training and therefore would not be affected by the use of the Stryker vehicle. The construction of Dillingham Trail would not fragment any natural vegetation communities. The trail is located in areas of agricultural use, and the vegetation that surrounds these areas is primarily nonnative species with some common natives.

A wetland delineation of DMR was conducted in the spring and summer of 2002 following procedures outlined in the ACOE 1987 wetland delineation manual; results were published in a report dated August 2002 (USACE 2002d). Those conducting the survey identified one jurisdictional wetland on DMR (USACE 2002d). The wetland is spring fed, is dominated by primrose willow, and is approximately 287 square yards (240 square meters) (USACE 2002d). This perched wetland is within the ROI but outside of the area that will be used for maneuver training.

An additional wetland area was investigated at DMR. Based on an evaluation by the Corps of Engineers, Honolulu District, Regulatory Branch, dated September 4, 2002, the wetland area was determined to be non-jurisdictional and, therefore, not regulated under Section 404 of the Clean Water Act. (See Appendix E).

Threat to migratory birds. The presence of the FTI antennas could significantly affect migratory bird species known to occur in the DMR ROI, especially those that migrate at night (USFWS 2000). Although the exact number of bird fatalities from tower collisions in Hawai'i is not known, birds are killed in large numbers worldwide by antenna support structures each year (USFWS 2000). This is a violation of the MBTA (16 USC 703-712), which prohibits taking or killing migratory birds. Tower size is also considered a factor, with towers taller than 200 feet (61 meters) responsible for the greatest number of bird fatalities (Manville 2000). The

FTI antennas would be no taller than 100 feet (33 meters) and would be mounted on existing structures where practicable. A full description of the FTI antennas is in Appendix D.

Migratory bird species known to occur at DMR that could be adversely affected by the Proposed Action include the white-tailed tropicbird, black-crowned night heron, barn owl, golden plover, and northern cardinal (USARHAW and 25th ID [L] 2001a). USFWS tower guidelines (USFWS 2000), attached in Appendix I-2, would be integrated into the Proposed Action to ensure that MBTA species would not be affected by the construction and placement of antennas in the SBCT ROI. Key avoidance measures include using no lighting or guy wires on the towers and keeping all towers below 199 feet. UAVs would fly over the training area as discussed Section 5.4. The UAV activity is not anticipated to threaten migrating birds.

Noise and visual impacts. Increased movement of vehicles along Dillingham Trail would lead to an increase in human noise, which could have adverse effects on wildlife by deterring them from using the land to forage, rest, or breed. General SBCT training would occur only in areas already used for training at DMR. No new helicopter use would be added to that now used at Dillingham. There will be new use of UAV flights, but this would be over military ranges and would have minimal impact. Airfield use is ongoing and thus aircraft noise is not expected to significantly affect wildlife species at DMR.

These impacts are expected to be less than significant based on the highly developed nature of much of the proposed trail area and the limited use of the trail once it is built. Noise produced as part of proposed training activities would be mitigated by ongoing Army environmental management (Section 2.2.4). Additionally the Army has agreed in the Biological Opinion to notify USFWS if it observes any threatened or endangered avian species at DMR. The Army, in coordination with USFWS, also will establish natural noise barriers if federally listed wetland bird species are present at the nearby Dillingham Ranch pond and will conduct surveys of the pond near the DMR trail to determine presence of and federally listed wetland bird species. If any are present the Army will determine if these species are nesting and if trail noise is having an adverse impact. These measures would ensure that noise and visual impacts on sensitive species would be less than significant.

Less than significant impacts on marine wildlife resources in the DMR ROI are expected as a result of military aircraft noise. UAVs are unlikely to occur over water in the DMR ROI due to difficulty of deployment in the proximity of civilian aircraft. The air-water surface is an extremely effective barrier for noise. Airborne noise is transmitted to the underwater environment only when the noise source is essentially directly overhead (Richardson et al. 1995). Ambient noise levels on shorelines are already quite high naturally, and marine mammals and sea turtles have adapted to this. No aircraft are known to land on the beach or shoreline. Flights at DMR ROI would be relatively infrequent, short-lived, and unlikely to traverse the same section of coast or offshore area every time.

Less than significant impacts on marine wildlife resources in the DMR ROI are expected as a result of SBCT related military aircraft visual events because there would be no change in aircraft use at DMR except for the introduction of UAVs. The probability of significant

aircraft visual impacts on marine wildlife at a population level as a result of SBCT aircraft activities in the coastal waters or shoreline of the DMR ROI is considered to be low and less than significant based on flight use patterns described above.

### No Impacts

Runoff impacts on marine wildlife and coral ecosystems. No impacts from potential runoff are expected for marine wildlife resources or coral. No increase in run-off as a result of SBCT activities is expected. DMR is on the leeward side of the island, so storm runoff is minimal. The expected increase in erosion, described in Section 6.08, would be within the natural range due to rainfall and runoff variation, and no impacts are expected on marine wildlife. Short-term impacts from construction and use of the trail would be reduced to less than significant levels by implementing standard construction BMPs for runoff control. There are no contaminants moving off the ranges, and surface water and groundwater are not expected to be contaminated (see Section 6.8, Water Quality). There is not expected to be any runoff carrying contaminants from UXOs to nearshore ocean waters. There are no UXOs in the marine ROI. No water-contaminating activities are occurring in the upland portions of the marine ROI habitat, so there would be no direct effects from runoff on marine wildlife or coral reefs and their associated organisms.

The Army initiated an informal consultation with NOAA Fisheries in accordance with Section 7 of the ESA. NOAA Fisheries concurred with the Army's determination that the proposed action was not likely to adversely affect federally listed species, marine mammals, or designated essential fish habitat. (See Appendix E).

### **Reduced Land Acquisition Alternative**

The impacts associated with RLA would be identical to those described for the Proposed Action.

### **No Action Alternative**

No Action would result in no new impacts on biological resources, but would involve a continuation of existing impacts. An in-depth analysis of current force training impacts on DMR biological resources can be found in the *O'ahu Training Areas INRMP* (USARHAW and 25th ID[L] 2001a) and the *Endangered Species Management Plan Report (ESMPR) for O'ahu Training Areas* (R. M. Towill Corp. 1997b). All conservation measures detailed in the 2003 BO for Routine Military Training and Transformation of the 2<sup>nd</sup> Brigade 25<sup>th</sup> ID(L) at U.S. Army Installations on the island of O'ahu (USFWS 2003d) will be enacted under this alternative as well. A synopsis of No Action Alternative impacts is given below.

### Significant but Mitigable to Less than Significant Impacts

Impact 1: Impacts from fire on sensitive species and sensitive habitat. Impacts from fire on sensitive species and sensitive habitat would continue under No Action. Several current force actions are potential sources of fires at DMR, including vehicle traffic (R.M. Towill, Corp. 1997b). There is a high risk of fire due to troop training in the DMR dry Mokulē'ia region (R.M. Towill, Corp. 1997b). To reduce potential impacts from fire, the Army will implement the terms and conditions identified in the Biological Opinion for current force and SBCT proposed training on the island of O'ahu including the development and implementation of

the O'ahu Implementation Plan to aid in the stabilization of listed species. In addition, the Army has developed an Integrated Wildland Fire Management Plan (IWFMP) to minimize impacts from fire by undertaking the following:

- Constructing two firebreak roads at DMR;
- Regularly updating incident command system contact personnel and reviewing fire control protocols;
- Posting signs about the Army's regulations concerning ignition sources; and
- Improving fire education and awareness by preparing educational materials on fire hazards and preventive measures.

Impact 2. Impacts from construction and training activities on sensitive species and sensitive habitat. There have been and would continue to be impacts on the listed plants and wildlife. Vehicle and dismounted maneuvers, along with nonlive-fire training at DMR, occurs primarily on disturbed portions of the ROI that are of low value to Hawai'i's listed species. However, the effects of fire, spread of nonnative species, noise pollution and visual presence of humans in or nearby designated and sensitive habitats negatively affects listed species that use or would potentially use this area.

The Army has completed ESA Section 7 consultation for the impacts on federally listed species from routine training at DMR; the same mitigation measures described under the Proposed Action would apply here. Ongoing programs that would lessen the impact on listed species and their sensitive habitat include the ecosystem management plan, endangered species management plan, and INRMP (USARHAW and 25<sup>th</sup> ID[L] 2001a; R. M. Towill Corp. 1997b). The measures outlined in these plans (for example, monitoring and outplanting) would help avoid effects and would compensate for impacts on listed species that would result directly and indirectly from implementing the No Action.

Impact 3. Impact from the spread of nonnative species on sensitive species and sensitive habitat. The impact on sensitive species resulting from the spread of nonnative species would continue under No Action. Nonnative plants and animals, some of which may be invasive, have likely been introduced and would continue to be introduced into natural areas at DMR. Under the status quo of No Action, impacts on biological resources would continue at current levels. In compliance with the BO and EO 13112 on invasive species, the Army would continue to undertake all feasible and prudent measures to minimize the risk of harm caused by invasive species. Several habitat-modifying introduced plants are documented as having invaded DMR's natural areas. Species such as koa haole, guinea grass (*Panicum maximum*), and Christmas berry (*Schinus terebinthifolius*) are particular threats. These species, along with other invasive plant species, are expected to continue to spread further as a result of current actions. Introduced invertebrates at DMR could include the invasive black twig borer, which is a known pest of plant species that occur at DMR and is suspected to be at the site. Provisions are made for reducing these impacts in the O'ahu Training Areas INRMP (USARHAW and 25<sup>th</sup> ID[L] 2001a) by surveying for nonnatives, fencing out invasive mammals, increasing weed eradication, and removing nonnative invertebrates. These impacts are minimized by limiting training areas, keeping inventories of species of concern with the

potential to occur at SBMR, and promoting conservation by educating the military and the general public, all of which are included in ongoing Army environmental management programs (Section 2.2.4).

#### Less than Significant Impacts

Impacts from construction and training activities on general habitat and wildlife. Troop and other foot traffic in or adjacent to native forests would continue to impact natural communities, plants, and snails (R. M. Towill Corp. 1997b). These impacts are minimized by limiting training areas, keeping inventories of species of concern with the potential to occur at DMR, and promoting conservation by educating the military and the general public, all of which are included in ongoing Army environmental management programs (Section 2.2.4). Training impacts would continue to be managed to limit trampling and overall loss of habitat range (R. M. Towill Corp. 1997b).

Threat to migratory birds. Current force activities would continue to have a less than significant impact on migratory birds. Status quo activities in the ROI may incidentally affect migratory birds but are unlikely to severely disturb birds, considering the highly disturbed nature of the present training area.

Noise and visual impacts. Noise would continue to be produced as a result of current activities. Noise would have an adverse impact on animals in the area due to disturbance but would not significantly affect their behavior and would not lead to a population level decline. Studies such as the *Final Report: A Study to Determine the Effects of Noise from Military Training on the Endangered O'ahu 'Elepaio* (HINHP 1998) show that Army-related noise on O'ahu has not significantly affected species, including sensitive species, such as the 'elepaio. There are no visual impacts under this alternative.

#### No Impacts

Runoff impacts on marine wildlife and coral ecosystems. SBCT activities at DMR are not expected to result in runoff impacts on marine wildlife and coral ecosystems due to limited activities that would occur there.

The Army initiated an informal consultation with NOAA Fisheries in accordance with Section 7 of the ESA. NOAA Fisheries concurred with the Army's determination that the proposed action was not likely to adversely affect federally listed species, marine mammals, or designated essential fish habitat. (See Appendix E).